SONY

Quick Reference Guide

PXW-**FS7**
PXW-**FS7M2**

sony.net/pro/PXW-FS7
sony.net/pro/PXW-FS7M2

This guide has been optimised for mobile viewing and is fully interactive

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A. Introduction to this guide

A1. Introduction

This guide does not replace the user manual. It is intended to be used in conjunction with the user manual and it is recommended that you read both this guide and the user manual to get the very best from the camera.

Where you see text in bold it indicates a menu setting, button or switch setting. For example:

(MENU: System – Base Setting – Shooting Mode)

Indicates: refer to the camera menu, System page, Base Setting page, Shooting mode sub page.

Where there are multiple menu choices a suggested or recommended setting will be given as an initial starting point to get you going. These settings should give good results in the majority of cases.

Status Button: The STATUS button on the camera body allows you to view several pages of information about the way the camera is set up. This can be very useful for checking settings, audio levels and setup, media remaining and camera configuration. Press STATUS to enable the status display pages and then use the scroll wheel to step through the information screens. Pressing STATUS again will turn the status pages off.

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B. Saving the camera setup

B1. All files All files are a great way of quickly changing shooting modes and saving your favorite settings. Once you have the camera setup in a way you are happy with I recommend saving those settings as an All File. See the section on all files for more information.

All Files: All Files can be used to save a snapshot of the way the camera is set up or to load a specific set of camera settings.

An all file saves almost every available user setting, including things like frame rate, shooting mode, paint settings, viewfinder and MLUT settings. All files are very useful for quickly switching between modes of operation or for sharing settings across multiple cameras. Each all fie can be given a unique alpha-numeric name that describes the settings being saved. You can save up to 99 all files on an SD card.

To save an all file you will need to insert an SD card (SD card or SDHC card) into the SD card slot. You do not need a large capacity SD card. The files are very small. An 8GB card would be large enough for most peoples needs.

To save an All File first you must set the name for the All File you wish to save.

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(MENU: File – All File – File ID)

Set the file name and select **Done** when finished.

Then save the file:

(MENU: File – All File – Save SD Card)

Choose an empty “No File” location to save the file in an unused location or overwrite a previously saved all file with the new file.

To recall an All File:

(MENU: File – All File – Load SD Card)

Choose the desired All File from the list and press SEL/SET to load. The camera may reboot during the loading process.

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C. Choosing the right operating mode

C1. Understanding the different operating modes

Custom Mode and Cine EI Mode: The PXW-FS7 has two distinctly different operating modes which are called “Custom” and “Cine EI”. The camera will create high quality images at all available frame rates and resolutions in both modes.

In Custom Mode the PXW-FS7 behaves much like any other conventional video camera where the picture you see in the viewfinder is the picture recorded to the XQD cards and this is the image the end viewer will see.

This is the image as seen in the viewfinder and this is the image recorded when shooting in custom mode.

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C. Choosing the right operating mode

In the Cine EI mode the camera operates using optimized settings that allow it to capture the widest possible dynamic range and color range. This wide range image will look flat and washed out if viewed directly. But it contains a huge amount of picture information that can be manipulated and adjusted on a computer in post production to achieve the desired final look. To make shooting this way easier the camera incorporates a system of MLUT's (Monitor Look Up Tables) that allow the operator to see in the viewfinder or on a monitor an approximation of how the footage being shot will look after it has been adjusted in post production.

This is the picture that is recorded in the Cine EI mode.

And this is how the image may look after post production grading.

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C1.1 More information on custom mode

In this mode you have the ability to change many of the cameras image quality settings including gamma (contrast and brightness range), the matrix (color) and sharpness if you wish to alter the look of the recorded images. In most cases in this mode the dynamic range (scene brightness range) that can be captured is limited by the need to create an on screen image with natural looking contrast and colors that will not need any further adjustment. To achieve this the camera must produce a signal range that is directly compatible with the display device that the pictures will be viewed on. For HD TV this standard is called “Rec-709”.

Having to stay within the limitations of conventional TV and monitor displays does impose some limitations on the amount of adjustment available within the camera and on the dynamic range that can be captured while still producing a realistic looking image. But by staying within this range very often it is not necessary to adjust the images in post production.

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C. Choosing the right operating mode

Custom mode would normally be used for projects that have little or no time for post production grading or adjustment. Where a fast turn-around is important or a simple, straight forward workflow is desired. Although the image quality in custom mode can be very high, it is normally possible for experienced users to get better quality images and greater post production flexibility by using the Cine EI mode.

C1.2 More information on Cine EI Mode

The Cine EI mode is quite different to custom mode and the way a conventional video camera works. In the Cine EI mode the camera is setup to capture the greatest possible brightness and color range. A range that will often exceed what can be shown correctly on a conventional TV or monitor. These extended range images are then taken in to post production where they will be adjusted or “graded” to create the desired look for the finished production.

As a result of the greatly extended capture range the images captured will typically look very flat and lack contrast and color if viewed on a conventional monitor. This can sometimes make exposure assessment difficult.

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C. Choosing the right operating mode

To help with exposure and to help gauge what the material will look like after grading the camera can apply a **M**onitor **L**ook **U**p Table (MLUT or LUT) to the viewfinder or monitor outputs. The MLUT converts the image from the flat looking S-Log2/3 range to a conventional viewing range. Different MLUT's can be used to give different monitoring ranges and different looks. You can even load user created MLUT's in to the camera. The MLUT isn't normally recorded. It is just added to the viewfinder or monitor output as a tool to help estimate what the final pictures will look like.

In order to maximize the cameras dynamic range in Cine EI the recording ISO of the camera is locked to it's native ISO of 2000. To help cope with difficult or challenging lighting situations the camera can be "rated" at a higher or lower equivalent ISO by changing the cameras **E**xposure **I**ndex or EI. This changes the brightness of the MLUT or LUT rather than the actual recording ISO. For a detailed explanation of this please see the Using Cine EI chapter.

In the Cine EI mode the auto exposure functions such as auto iris, auto shutter speed and automatic gain (AGC) are disabled, so exposure must be set and adjusted manually.

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D. Preparing the camera and shooting

D1. Preparing to shoot

After switching the camera on you may see a message saying “Execute APR”. This is not an error or malfunction. The APR function minimizes the appearance of bright or dark sensor pixels and minimizes sensor noise.

Cover/cap the lens and press SEL/SET to execute the APR function.

If you do not perform APR you will be reminded to perform APR the next time the camera is turned on. You should perform APR regularly to maintain the best possible image quality.

Choose the appropriate frame rate, frame size and recording codec for your production.

D. Preparing the camera and shooting

D1.1 Start by setting the country area. The country area setting determines which frame rates are available. Choose PAL Area to enable 50i/50p/25p, choose NTSC Area for 60i/60p/30p//23.98p/24p.

D1.2 Next choose the recording codec.
(MENU: System – Codec - Select).
The options available will depend on the whether you have the extension unit installed on the camera or not.

Recommendation: Use the XAVC-I codec. This codec offers the greatest frame rate flexibility combined with excellent image quality for HD, UHD and 4K. XAVC-L may be considered for situations where you do not have enough media for XAVC-I. MPEG HD 422 may be needed when only legacy edit systems are available.

D. Preparing the camera and shooting

MPEG HD 422: HD only, the same as the XDCAM 422 codec, 8 bit, 422 at 50Mb/s. Good for news, quick turn-around, small file size. Not best for heavy post production work or grading, Not recommended for use with S-Log2/3.

XAVC-I: HD/UHD/4K DCI. XAVC-I is always 10 bit 422. XAVC-I is normally the easiest version of XAVC to edit, requiring the least processing power. XAVC-I is the best choice for working with S-Log2/3.

XAVC-L: HD/UHD XAVC-L is a long GOP codec offering similar image quality to XAVC-I but with a smaller file size. In HD it is 10bit 422. In UHD it is 8bit 422 (not recommended for S-Log2/3).

In HD there 3 bit rate choices of 50, 35 and 25Mbps. 50Mbps offers image quality comparable to XAVC-I. 35Mbps is comparable to MPEG2 HD 422 50Mbps. 25Mbps is suitable for corporate or other professional non broadcast applications.

XAVC-L requires more processing power in post production than XAVC-I, so a high performance computer is recommended.

ProRes (with XDCA-FS7 only): HD only. ProRes is a widely adapted codec originally developed by Apple for use in post production but now finding use as an acquisition codec. ProRes 422 HQ offers slightly higher quality than ProRes 422.

Raw (with XDCA-FS7 only): High quality external recording option that allow the recording of raw sensor data on a compatible external recorder.

D. Preparing the camera and shooting

D1.3 Now select the frame size/recording format and frame rate. The **(MENU: System – Rec Format – Video Format)** page is where you set the frame size and frame rate that will be the cameras base rate. The options available will depend on the country area and codec choice.

1920x1080 = HD, 3840x2160 = UHD (the standard frame size for consumer 4K television), 4096x2160 = 4K DCI (the standard for 4K digital cinema).

If you have chosen XAVC-L as well as frame size and frame rate you will also have a choice of different data rates for the 1920x1080 modes. These are 25, 30 and 50 Mb/s. 50Mb/s is the highest quality and recommended for broadcast productions.

Choose the operating mode.

Recommendation: Use Custom mode unless you understand the Cine EI operating mode.

Choose between Custom Mode or Cine EI Mode:

(MENU: System – Base Settings – Shooting Mode).

The camera should now be ready to start shooting.

D2. Shutter Speed or Shutter Angle

It is recommended that to avoid issues with flicker from some types of light fixtures that the shutter speed is set to a multiple of the local mains electricity frequency. Please check the mains frequency of the country you are shooting in to determine the most appropriate shutter speed. In a 50Hz country 1/50 or 1/100 is recommended. In a 60Hz country 1/60 or 1/120 is recommended.

D2.1 The shutter speed or shutter angle effects how motion is portrayed in the recordings. A very fast shutter will freeze rapid movements in each frame of the recording making them crisper but possibly adding judder or jitter. Too slow a shutter speed will result in blurred motion and handheld camera wobble can result in soft looking pictures. In addition a fast shutter speed reduces the amount of captured by the sensor.

The camera can display the shutter time period as either fractions of a second (shutter speed) or in degrees. In either case the operation of the shutter is identical, there is no difference in the quality of the images captured.

D. Preparing the camera and shooting

Shutter speed is the easiest to understand and is similar to how the shutter period would be expressed in a stills camera. With Shutter Speed the shutter timing remains fixed at the speed set even if you change the recording frame rate (unless the shooting frame rate is increased beyond the set shutter speed, in which case the shutter speed will become set to the slowest possible speed for the shooting rate chosen).

The Shutter Angle setting mimics the way the shutter period of a movie film camera would be expressed. The shutter in a film camera is a spinning circular disc, part of which is cut away to allow light to fall on the film. The most commonly used shutter angle is 180 degrees, which is half of the 360 degrees of a full circle. So a 180 degree shutter on a film camera would allow light to fall on the film for half of the shutters rotation period. In a video camera this means that the sensor will capture light for half of the recording frame rate. For example, if shooting at 24fps a 180 degree shutter will be open for half of 1/24 which is 1/48th of a second. With shutter angle, if you change the recording frame rate the shutter speed will also change as it will always be the same fraction of the recording rate.

D2.2 To change the shutter period indication between Speed and Degrees go to **(MENU: Camera – Shutter – Mode).**

To change the shutter speed: Press the Shutter button on the side of the camera body and use the scroll wheel to choose your desired shutter speed or angle. Then press the sel/set button to set the shutter speed. Do not press the shutter button again you wish to set the shutter speed control to automatic.

Suggested settings are 180 degrees or for 50Hz countries 1/50 and for 60Hz countries 1/60.

D3. Setting the Gain or ISO (Custom Mode)

The signal that comes from the cameras sensor can be made brighter by adding additional amplification by increasing the gain of the cameras image processors. This may be useful when shooting in low light situations. However it should be noted that when you increase the camera's gain, as well as making the desirable image brighter you will also increase the noise seen in the image. Because of this it is normally desirable to use the lowest possible amount of gain for the best results.

The gain setting of the camera can be displayed as "gain" in dB or as the equivalent ISO rating of the camera.

D3.1 dB gain is easy to understand. 0dB is no added gain and the optimum setting for the best possible image quality. Every time you increase the gain by 6dB you are making the picture twice as bright (equivalent of opening the lens aperture by 1 stop). But adding 6dB of gain also increases the noise in the image by a factor of 2. Adding +6dB gain makes the picture twice as bright but 2 time noisier, adding +12dB will mean a picture 4 times brighter than 0dB but also 4 times noisier and so on.

D. Preparing the camera and shooting

ISO can be a little more confusing. ISO is used to determine the correct exposure for a camera when using an external light meter. As different gamma curves require slightly different exposure levels the optimum ISO (native sensitivity) will vary depending on the gamma curve used.

STD Gamma curves = 800 ISO = 0dB

Hypergamma HG1, HG2, HG3, HG4 = 800 ISO = 0dB

Hypergamma HG7, HG8 = 1600 ISO = 0dB

S-Log2 and S-Log3 = 2000 ISO = 0dB

If you double the ISO, for example going from 800 ISO to 1600 ISO this is the same as adding 6dB of gain. So if you are using STD gamma and the camera is set to 1600 ISO that is the same as STD gamma at +6dB gain.

I recommend that to avoid confusion when in custom mode you should use dB gain rather than ISO.

D3.2 To select the use of gain or ISO (MENU: Camera – ISO/Gain/EI – Mode).

Manual gain control is then done via the gain switch on the side of the camera body the gain or ISO level assigned to each of the 3 switch positions can be set in:

(MENU: Camera – ISO/Gain/EI – ISO/Gain<L>) etc.

To enable/disable automatic gain control press the Gain button on the camera body.

If using the Cine EI mode please see the section on “Exposure Index”.

D4. White Balance (Custom Mode)

Setting the white balance correctly ensures that white objects in the scene appear white and that the overall color response of the camera is true to life. There are several ways of setting the white balance.

Pressing the white balance button on the camera will toggle between automatic white balance (ATW) and the white balance function selected by the white balance switch.

ATW: The camera can determine the correct white balance automatically by continuously analyzing the scene being shot and adjusting the white balance while you shoot. This function is called ATW – Auto Tracing White Balance. Generally this works well but under some situations you may occasionally see a shift in colors while shooting.

With the white balance switch you can chose between PRESET white balance and MEMORY A and MEMORY B white balance.

D4.1 Preset

The white balance can be fixed to a set value. When the white balance switch is set to PRESET the preset value is used. To change the preset value go **(MENU: Paint – Preset White)** and select the desired color temperature.

D4.2 Memory Mode A and B

There are two memories in the camera that will remember the white value for a white target. To set the white balance correctly aim the camera at a white target such as a piece of white paper that is under the same lighting as the rest of the scene. Expose correctly and then press the **WB SET** button on the front of the camera. This will store the white balance in the memory selected by the switch.

D5. White Balance (Cine EI Mode)

When shooting using the Cine EI mode a white balance preset is selected using the white balance switch. Only 3 possible settings can be chosen, (Preset) 3200K, (A) 4300K, (B) 5500K. Choose the option closest to the scene you are shooting. Preset white balance is used to preserve the full dynamic range of the camera, fine tuning of the white balance would be done in post production as part of the normal grading process.

D6. Exposure, Zebras, Waveform and Histogram

Exposure is controlled through a combination of shutter speed, gain/ISO, iris aperture and ND filter. The camera includes a number of tools for measuring exposure.

D6.1 Zebras

Zebras are commonly used to measure the brightness of either skin tones or highlights. Zebra 1 is designed to be used for skin tones. **(MENU: VF – Zebra)**. For STD gammas the default level of 70% works well in most cases, a small amount of zebras appearing across a face. However for the Hypergammas the zebra level should be reduced to 60% for good results.

Zebra1 at 70% on skin tones with STD gamma (note how darker faces may not always show zebras at 70%).

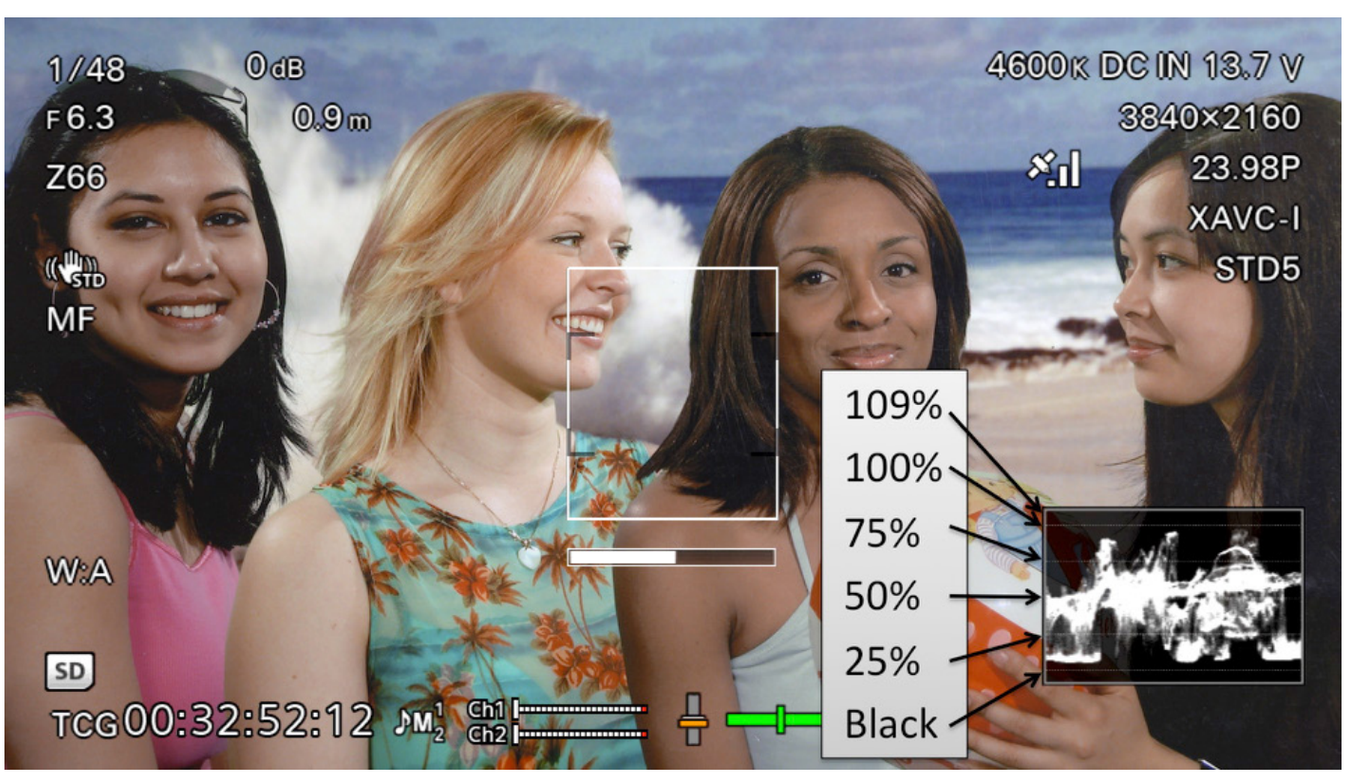
In **(MENU: VF – Zebra - Select)** you can choose whether to show zebra 1, zebra 2 or both in the viewfinder. The zebras can be turned on and off via the push button on the side of the viewfinder or with **(MENU: VF – Zebra – Setting)**.

In Cine EI when a MLUT is enabled for the Viewfinder the zebras measure the exposure levels of the MLUT as seen on the viewfinders LCD screen, not the S-Log2 or S-Log3 recording level.

D6.2 Waveform Vectorscope and Histogram

These are selected via (MENU: VF – Video Signal Monitor).

Waveform: The waveform display measures the brightness of the recorded image and displays the brightness levels on a vertical scale that goes from 0% or black at the lower dotted line at the bottom to 109% (clipping point) at the top. There are additional dotted reference lines at 25, 50 75 and 100%. The left side of the waveform meter represents the left side of the image being recorded while the right side of the waveform meter is the right side of the image.



The Waveform Monitor and the levels indicated

Vector: This is a vectorscope which is used to measure the color levels and color hue of what is being shot. In most cases it is not necessary to use the vectorscope.

Histogram: The histogram displays the exposure brightness on a horizontal scale where black is at the left and 109% (clipping point) is on the right. The vertical height of the indicated level represents the amount of the image that is exposed at that brightness.

The histogram

Video Signal Monitor Source: When shooting in the Cine EI mode it is possible to select whether the video signal monitor displays the levels of the recorded signal or the level of any LUT being used. Please refer to the Cine EI section of this guide to better understand which to use. The selected source signal is indicated just above the signal monitor.

(MENU: VF – Video Signal Monitor – Source).

D7. Aperture/Iris

D7.1 In Custom Mode the iris of an electronically controlled lens can be controlled automatically or manually. In the Cine EI mode only manual operation is possible.

In Custom mode pressing assignable button 2 (iris) toggles between manual and automatic control. When manual control is selected the Iris Push Auto button can be used to momentarily set the iris automatically. When using auto iris it is possible to include an offset to the exposure to brighten or darken the image, for example to brighten a backlit scene via

(MENU: Camera – Auto Exposure – Level).

D7.2 Custom and Cine EI modes

The iris can be opened and closed using the iris control wheel on the side of the camera or by assigning iris control to the assignable dial on the handgrip

(MENU: System – Assignable Dial).

D7.3 For a shallow depth of field, film-like look you should use a large aperture (f1.4 – f5.6). To avoid softening of the image due to diffraction effects you should avoid using very small apertures (f16, f22 etc). Most lenses provide the best performance in the middle of their aperture range. Use the cameras built in ND filters to maintain your desired aperture when there are high light levels.

Note that with some 3rd party lenses the iris may operate in steps and the lens may be heard to click. This is normal.

D8. ND Filter system

Neutral Density filters are used to reduce and control the amount of light falling on the sensor in bright filming conditions. They allow the use of larger apertures than would otherwise be possible in high light level scenes.

The PXW-FS7 has a system of 1 clear filter and 3 neutral density filters to assist with exposure control. The filters are selected via a knob on the side of the camera. The options are: Clear, 1/4ND (2 stops), 1/16ND (4 stops) and 1/64ND (6 stops). Use the appropriate amount of ND filtration to gain the most appropriate iris aperture.

D8.1 PXW-FS7 II and the variable ND filter

The PXW-FS7 II has an advanced **variable ND** filter system. When the filter dial is in the clear position there is no additional filtration in the optical path. When you select ND filter dial position 1, 2 or 3 the variable ND filter system is inserted into the optical path.

When the ND filter switch is set to preset you the filter provides 3 preset levels of ND filtration: 2 = 1/4ND (2 stops), 3 = 1/16ND (4 stops) and 4 = 1/64ND (6 stops). However if you wish you can change these preset ND levels in the menu

(MENU: Camera -ND Filter).

Switching the ND filter switch to Variable allows you to use the IRIS/ND Dial to vary the amount of ND filtration smoothly and seamlessly from 1/4ND (2 stops) to 1/128ND (7 stops). The variable function allows you to use the aperture you desire for the best depth of field or lens performance and then finely control the exposure via the variable ND filter.

D8.2 The Variable ND filter can also be made to operate automatically by engaging filter position 2, 3 or 4 and then pressing an assignable button that has been assigned the auto ND function. I suggest assigning Auto ND to button 7.

(MENU: System –Assignable Button).

D9. Focus, Peaking, Focus Indicator and Focus Magnification

D9.1 When fitted with a suitable auto focus capable E-Mount lens the camera can be set to Auto focus using the Focus Auto/Manual switch. In addition the Focus Push Auto button can be used to momentarily engage the auto focus system. Otherwise the camera can be focused manually. In order for the cameras auto focus functions to operate correctly if the lens has an AF/MF switch it must be set to AF. If using a lens with a focus ring that slides between AF/MF it must be in the AF position.

D9.2 The focus detection area of the auto focus system and the one push auto focus can be altered. If you chose the flexible spot function you can use the hand grip joystick or scroll wheel to move the focus detection area to any part of the frame.

(MENU: Camera – Focus)

The focus detection area (yellow box) can be moved by selecting “flexible spot” in the Camera – Focus menu.

To assist with obtaining the best possible focus there are a number of focus aids.

D9.3 Peaking

The cameras peaking function can be turned on and off via the peaking button on the side of the viewfinder LCD screen. The peaking settings can be changed in

(MENU: - VF – Peaking).

Often colored peaking is easier to see than normal balck and white peaking so consider setting the peaking type to color. Avoid using an excessively high peaking level.

Peaking works by enhancing the appearance of sharp and high contrast edges within the image by adding colored or black or white (normal peaking) highlights to the high contrast areas. This makes it easier to determine which parts of the image are in focus. However it should be noted that as peaking is contrast based, in high contrast scenes the peaking signal may be seen across large areas of the image, even areas not quite in focus. As a result peaking should be used with caution and high peaking levels should be avoided.

D9.4 Focus Indicator

The focus indicator appears as a bar graph across the lower middle of the viewfinder screen with a white box above **(Focus Area Indicator)**. The bar graph measures the sharpness of the image within the box. When the graph is all the way to the left the image is soft. When it is to the right it is sharp. Best focus is when the indicator peaks as far to the right as you can get it, typically about 75% of the full scale. The indicator will never get all the way to the right. The Focus Indicator and Focus Indicator Area box can be turned on and off in

(MENU: VF – Display On/Off – Focus Indicator /and/ Focus Area Indicator).

D9.5 Focus Magnification

The Focus Magnification Function allows you to magnify the image seen in the viewfinder to closer inspect the focus. Pressing assignable button 4 on the hand grip magnifies the image by 4x, pressing a second time by 8x and the third press returns the image to normal. Focus Magnification has no effect on the recordings or HDMI or SDI outputs so can be used at any time. When Focus Magnification is enabled the joystick on the handgrip can be used to select which part of the full image is magnified. The Focus Magnification function can be assigned to an assignable button in case you are not using the handgrip **(MENU: System – Assignable Button)**.

E. Advanced picture settings for Custom Mode

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1. Gamma and color settings in Custom Mode
2. Gamma categories (custom mode)
3. Custom Mode Matrix (color) settings

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E. Advanced picture settings for Custom Mode

E1. Gamma and Color Settings In Custom Mode

In Custom Mode you have the ability to change many of the cameras image quality settings including the Gamma Curve and Color Matrix.

The gamma curve of the camera can be changed to alter the contrast and dynamic range of the captured image **(MENU: Paint – Gamma)**.

Using different gamma curves can dramatically alter the look of the recorded image. There is no requirement to use any specific gamma curve. You should use the gamma curve that provides what you regard as the best looking images. It is worth experimenting with different gamma curve settings to achieve different looks.

A gamma curve with a large dynamic range will capture a larger scene brightness range but result in a flatter on screen image. A gamma curve with a smaller dynamic range will result in a higher contrast image but is only capable of capturing a narrower scene brightness range before the recorded image becomes over exposed.

E. Advanced picture settings for Custom Mode

E1.1 Suggested gamma settings

For shoots that take place under controlled lighting then the standard default gamma curve (STD5 R709) provides pleasing images with accurate contrast. For challenging lighting situations the Hypergamma gamma curves (HG) are very useful. If you are producing material that will be used directly within a broadcast TV show then HG1 is a good all round curve that is broadcast safe (does not exceed 100%). For very bright scenes then HG2 may be used.

For other productions where you do not need to ensure you are broadcast safe then HG3 works well as a general purpose curve and HG4 works well for very bright scenes.

(MENU: Paint – Gamma – Gamma Catorgory – HG) +

(MENU: Paint – Gamma – Gamma Select).

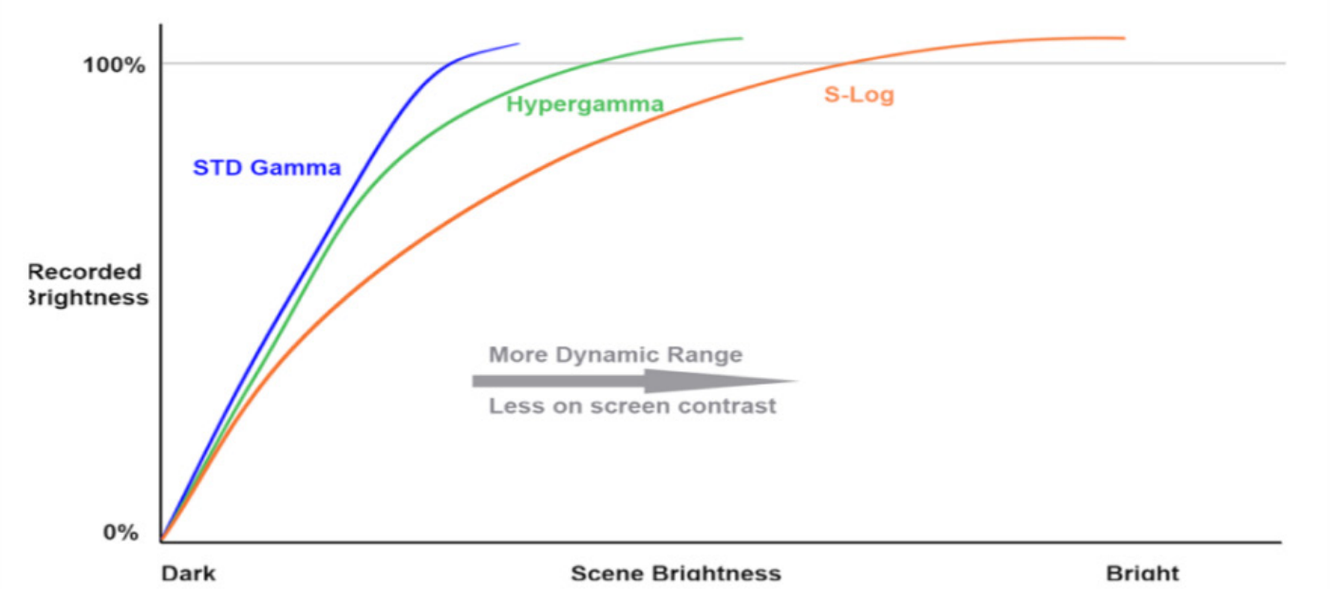
Note that if using zebras to check skin tone exposure you should reduce the zebra 1 level to 60%.

(MENU: VF – Zebra – Zebra 1 Level).

E. Advanced picture settings for Custom Mode

E2. Gamma Categories

The PXW-FS7 Gammas are split in to 3 categories: STD/ HG/S-Log **(MENU: Paint – Gamma – Gamma Category)**.



E2.1 STD

Standard Gamma. The gamma curves available under this category are all variations on standard television gamma. These curves will all provide realistic and true to life contrast when viewed on a conventional TV or monitor. However to comply with current television standards these curves have a limited dynamic range. This means that the scene brightness range that can be captured is restricted to maintain compatibility with normal TV displays. STG gamma curve STD5-R709 is the standard gamma for HD TV production.

E. Advanced picture settings for Custom Mode

STD-R709 Gamma Curve

E2.2 HG

Hypergamma. These advanced gamma curves are designed to capture a wider dynamic range than the standard gammas with only a small reduction in on screen contrast (normally the higher the cameras capture dynamic range the lower the on screen contrast will be). This is achieved through careful addition of a gradual highlight roll off. The different curves offer different dynamic ranges and as a result should be exposed slightly differently to standard gammas for the very best results.

E. Advanced picture settings for Custom Mode

The capture range and optimum exposure levels are indicated in the full name of the hypergamma curve, for example:

HG4609G40 = HG – 460 – 9 – G40, which indicates HG(Hypergamma), with an over exposure range 460% greater than standard TV gamma. Recording to 109% (the other option being a “0” which indicates recording to 100%). G40 being the optimum exposure for a 18% middle grey card of 40%.

In practice a Hypergamma with a lower “G” middle grey number, G33, G30 etc will be better suited to brighter scenes. A higher “G” number, G40 etc will be better suited to darker scenes. A larger dynamic range 460 or 800 will be good for high contrast scenes while a smaller dynamic range (360) will be better suited to controlled lighting.

E. Advanced picture settings for Custom Mode

Hypergamma 1

Hypergamma 2

Hypergamma 3

Hypergamma 4

I find that Hypergamma 4 works very well for brighter outdoor scenes while Hypergamma 3 works well for indoor scenes. Hypergammas 7 and 8 are also very good for challenging lighting situations.

E2.3 User

It is possible for advanced users to upload their own gamma curves to the camera.

E. Advanced picture settings for Custom Mode

E2.4 S-Log2

You can use the S-log2 gamma curve in Custom Mode to capture an extremely large scene brightness range (14 stops or 1300%). This will result in a very flat on screen image. The PXW-FS7 is primarily designed to use S-Log recording in the Cine EI mode but the option is also offered in Custom Mode to help deal with particularly difficult lighting situations.

S-Log3: Like S-Log2 you can use the S-log3 gamma curve in Custom Mode to capture an extremely large scene brightness range (14 stops or 1300%). Note that the peak recording level for S-log3 is 92%.

E. Advanced picture settings for Custom Mode

E3. Custom Mode Matrix Settings (Color adjustment)

The camera's color reproduction can be adjusted by making changes to the matrix settings.

(MENU: Paint – Matrix)

There are 5 preset matrix settings designed to give easy access to a number of different color responses.

E3.1 Recommended settings

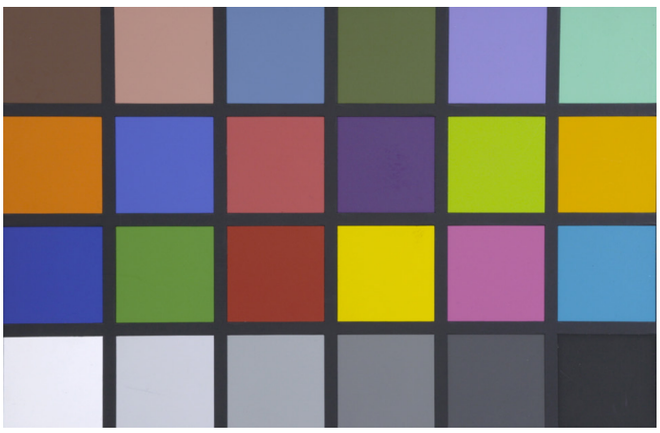
The standard color matrix works well for general purpose acquisition. If you are shooting under florescent lights or LED lights and you notice a green cast in your images the you should use the FL Light matrix.

For a more film-like look you should use the Cinema matrix. The Cinema matrix works very well when paired with a Hypergamma (HG) gamma curve.

(MENU: Paint – Matrix – Preset Select).

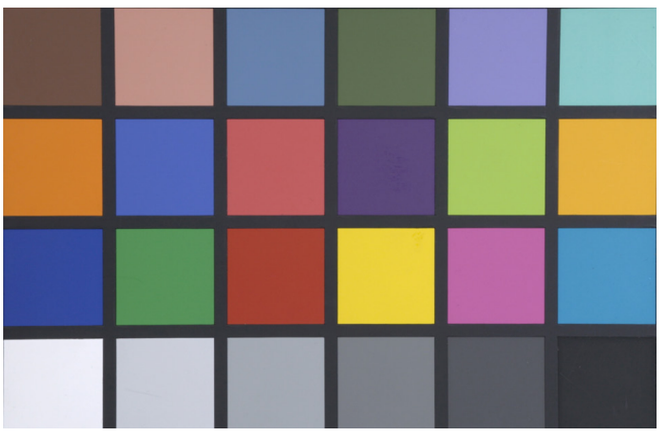
E. Advanced picture settings for Custom Mode

Standard Matrix



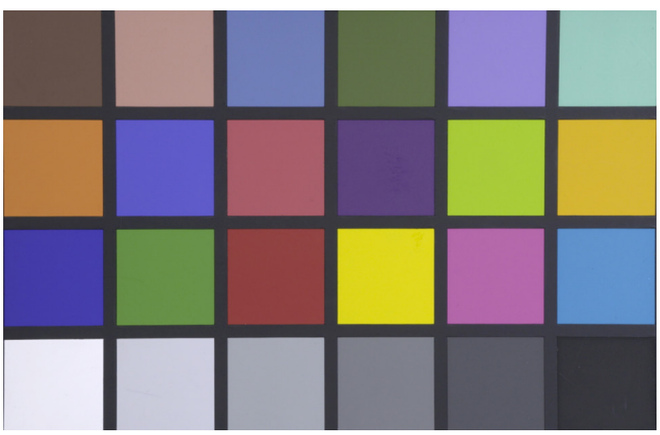
Standard Matrix

FL Light Matrix



FL Light Matrix

Cinema Matrix



Cinema Matrix

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E. Advanced picture settings for Custom Mode

Combining a Hypergamma with the Cinema Matrix produces images that are more film-like than the standard settings. In this example Hypergamma HG3 is combined with the Cinema gamma.

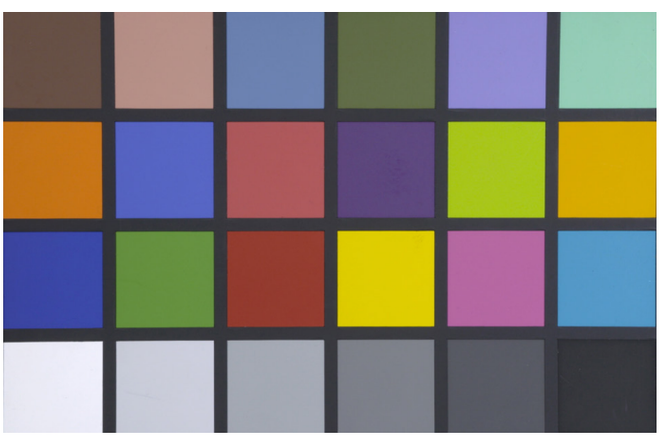
E3.2 PXW-FS7 II and the Rec2020 Matrix

The FS7 includes an additional matrix that complies with the new Rec2020 color standard. This standard allows for the capture and display of a wider range of colors than possible with Rec-709. Many recent TV's have the ability to reproduce the extended Rec-2020 color range.
If you are producing content that will be show on a Rec-2020 display you should use the Rec-2020 matrix.
Do not use the Rec-2020 matrix if the material will be shown on a conventional Rec-709 display as the colors will be reproduced by a Rec-709 TV/Monitor incorrectly.

E. Advanced picture settings for Custom Mode

E3.3 The High Saturation matrix can be used to provide vibrant colors for music or pop videos, but it must be noted that in some cases strong colors in the scene you are shooting will reach the maximum recording intensity more quickly.

Hi Sat Matrix

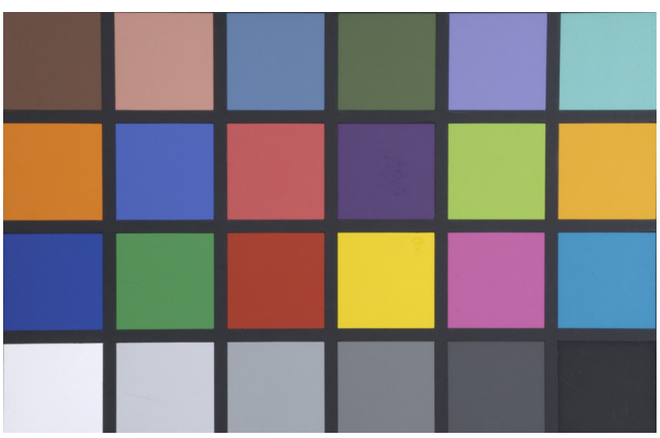


Hi Sat Matrix

E. Advanced picture settings for Custom Mode

The F55 709 Like matrix is designed to mimic the color response of the Sony F55 camera. It provides vibrant colors. This matrix can be used when trying to match the pictures from an FS7 to a PMW-F55 that is shooting Rec-709.

F55 709 Like Matrix



F55 709 Like Matrix

F. Detailed guide to the Cine EI Mode

F1. Using the Cine EI Mode

The Cine EI mode is quite different to custom mode and the way a conventional video camera works. In most cases when used correctly the Cine EI mode will result in superior images to custom mode.

When using the Cine EI mode first you must choose the Color Space and log curve that you wish to use.

Recommendation: For most applications S-Gamut3.cine/Slog3 works very well.

(MENU: System – Base Settings – Color Space).

Contents

F. Detailed guide to the Cine EI Mode

F1.1 Colorspace and S-Log2/S-Log3

In the Cine EI mode you have the ability to select one of 3 different color spaces and two different S-Log curves.

S-Gamut: The original Sony wide range color gamut. Allows a wider than normal color range to be recorded giving greater post production flexibility. Works in conjunction with S-log2.

S-Gamut3: Revised wide range color gamut that provides a similar color range to S-Gamut but with a color response that is normally easier to grade than S-Gamut. Works with S-Log3.

S-Gamut3.cine: Revised wide range color gamut with improved color response. Not quite as wide as S-Gamut or S-Gamut3 but still wider than can be reproduced by most of todays TV and cinema displays. The slightly reduced range makes this the easiest of the S-Gamuts to grade. S-Gamut3.cine is recommended for most production types. Works with S-log3.

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F. Detailed guide to the Cine EI Mode

S-Log2: Sony's second generation 14 stop log gamma curve. Excellent dynamic range, using the cameras full recording range. Can sometimes be tricky to grade well without the use of LUT's. This is the same curve as used in Sony A7s.

S-Log3: 3rd generation 14 stop log curve very similar to the "Cineon" standard used for digital film prints. Also very similar to Arri's LogC. Easy to grade (especially when used with S-Gamut3.cine). Note that the peak recording level is only 92%, the video levels never go above this in order to match the Cineon and Arri curves.

Recommendation: Use S-Gamut3.cine and S-log3 unless there are good reasons to use a different combination.

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F1.2 Exposing via an MLUT, suggested settings

Recommendation: Enable MLUT's for SDI2, HDMI and Viewfinder. Ensure that the MLUT is OFF for SDI1 & Internal Rec. **(MENU: Video – Monitor LUT)**.

Recommendation: Use LUT Category – LUT, LUT Select – P1:709(800). **(MENU: Video – Monitor LUT).**

Recommendation: Set the Exposure Index switch settings as follows:

(MENU: Camera – ISO/Gain/EI).

Exposure Index<H> 2000, Exposure Index<M> 800, Exposure Index<L> 640.

Set the L/M/H gain/EI switch to M (800EI) for general purpose shooting. Use H (2000EI) for very bright, high key scenes with few shadows. Use L (640EI) for scenes with few highlights where shadow information is important.

Expose by looking at the viewfinder image with the MLUT applied. For the 709(800) MLUT use conventional exposure levels, for example Zebra 1 at 70% for skin tones.

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F. Detailed guide to the Cine EI Mode

MLUT operation is limited to ON or OFF for all outputs and internal recording in each of the following situations: The HDMI output is set to 4K/UHD. S&Q Motion is enabled. Lens distortion compensation is set to AUTO

(MENU: System – Lens – Distortion Comp)

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F. Detailed guide to the Cine EI Mode

F1.3 The Video Signal Monitor can be used to measure either the MLUT level or the Internal Recording level.
I recommend measuring and monitoring the MLUT level for the correct operation of the Cine EI mode

(MENU: VF – Video Signal Monitor – Source – SDI2)

Note that if the SDI output is disabled, selecting the source as SDI2 will still allow you to monitor the MLUT levels as seen in the viewfinder. The Video Signal Monitor source is indicated just above the Video Signal Monitor.

The viewfinder image with the 709(800) MLUT applied, correctly exposed. Note the indications for what is being recorded and what is being measured by the Video Signal Monitor.

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F. Detailed guide to the Cine EI Mode

F1.4 In the Cine EI mode the way you expose your footage is different to custom mode. In order to obtain the cameras full dynamic range the camera must record at it's native ISO of 2000.

In addition the exposure levels used by log gamma curves are different to conventional gammas and the log image will look flat and washed out when viewed on a conventional monitor.

To make exposure and focusing easier you can apply a MLUT (Monitor Look Up Table) to the viewfinder and/or monitor to convert from the flat, dull looking S-Log2/3 image to a more normal looking image with more contrast and better color. Then set your exposure by looking at the image with the LUT applied rather than trying to expose by looking at the S-Log recording.

When the LUT is correctly exposed, so too is the S-Log2 or S-Log3 recording. For exposure the built in 709(800) LUT is very good as this uses conventional video levels and it is normally very obvious when the exposure is right. When an MLUT or LUT is being used the cameras zebra function measures the MLUT/LUT output. So if you wish to use zebra's for exposure assessment (when viewing via a LUT) you should set and use the zebra function exactly as you would for normal gamma curves.

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F. Detailed guide to the Cine EI Mode

F1.5 One issue with most LUT's is that the LUT cannot show you your full recording range. There is however a simple way to check the full range of the recordings by using a function called "High/Low Key".

Before you can use this function you must first assign it to one of the cameras assignable buttons. I suggest assigning it to button <2> the "Iris" button as this button has no effect in the Cine EI mode.

MENU: System – Assignable Button - <2> - High/Low Key

Once assigned to a button, one press of the button will show the "High" exposure range allowing you to view how the highlights within the scene are being recorded. This is an easy way to check for any highlight clipping issues. The second press of the button will show the low key or darker parts of the scene allowing you to see how well the camera is seeing in to the deepest shadows. The third press of the buttons returns to view to the LUT's normal range.

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F. Detailed guide to the Cine EI Mode

The viewfinder image with 709(800) MLUT applied. Looking at this image you may be concerned that the brightest highlights will be recorded too bright. Using the Hi Low Key function you can check the highlight and shadow areas of the image recorded image.

After the first press of the Hi Low Key assigned button the MLUT is darkened to allow you to check for clipping in the brighter parts of the image. As you can see the highlights in the image are not clipped so will be recorded without clipping by the wide range S-Log2 or S-Log3 recording.

Pressing the Hi Low Key button again brightens the MLUT image so you can check the darker parts of the recording range.

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F. Detailed guide to the Cine EI Mode

F1.6 Changing the exposure index (EI)

Changing the exposure index (by using the L/M/H switch) changes the brightness of the LUT/MLUT. It has no direct effect on the recordings, the camera continues to record at it's native 2000ISO.

However when you decrease the EI, for example selecting an EI of 800 (the default L setting) the images seen via the LUT become darker, the equivalent of changing the LUT's ISO to 800. In response to this darker image you would now adjust the exposure by opening the aperture to restore the LUT'd image back to a normal brightness.

This is the 709(800) MLUT viewfinder image when exposed correctly at 2000 EI.

This is the brightness of the S-Log3 recording when the EI is set to 2000 EI and the 709(800) MLUT is exposed correctly.

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F. Detailed guide to the Cine EI Mode

This is the 709(800) MLUT viewfinder image after switching the EI from 2000 EI to 640 EI with no change to the aperture or shutter speed. To compensate for this dark image on the monitor or in the viewfinder you should open the aperture to compensate.

By opening the aperture the brightness of the MLUT is restored to a normal level.

Opening the aperture to compensate for a dark MLUT results is brighter S-Log recording. This is often beneficial as after grading there will be less noise in the image.

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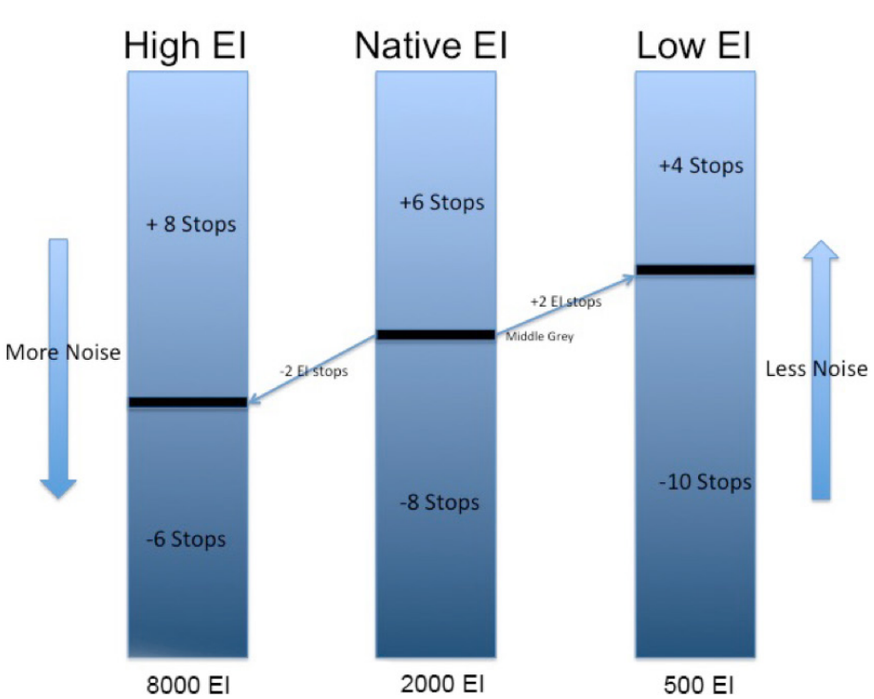
F. Detailed guide to the Cine EI Mode

As the cameras actual recording ISO has not changed opening the aperture results in a brighter recorded image. With conventional gammas this would be a problem but with S-Log2/3 there is typically enough headroom in reserve to cope with this deliberate over exposure. Don't forget, if you are concerned about highlight clipping you can use the High/Low Key function to check for this.

When your recording is good and bright, in post production the colorist will tend to reduce the brightness of the scene for a natural looking picture. This post production level reduction will also bring down the noise levels within the pictures resulting in cleaner less grainy images.



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F. Detailed guide to the Cine EI Mode

The cameras total dynamic range does not change when you adjust the EI. What you are doing is altering the mid point of the dynamic range. Using a low EI results in a brighter S-Log recording with a deeper shadow range but reduce highlight range. Using a high EI (it is not normally advisable to exceed 2000 EI) results in a reduced shadow range but increased highlight range. you are shooting an extremely bright scene where highlights are a concern then you can use a high EI to give more over exposure headroom. When you shoot with a high EI the images scene via the LUT will be brighter than normal.

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F1.7 Correct Exposure When MLUT's can't be used

MLUT's cannot always be used just for the viewfinder or monitor when the camera is shooting in S&Q motion or when the HDMI output is set to UHD. So in order to expose correctly you must check the exposure level of the S-Log2/3 images directly.

One of the easiest ways to do this is by using a dedicated 90% white card (available form most good photo/video stores) or a piece of white paper to set the correct white level. The cameras Zebra's can be used to measure the brightness of the white card or paper.

MENU: VF – Zebra – Setting – On

MENU: VF – Zebra – Zebra Select – 1

MENU: VF – Zebra1 Level – 59 (for S-Log2) 61 (for S-Log3)

MENU: VF - Zebra1 Aperture Level – 4%

Once the zebras are set as above simply place your white card in the shot and adjust the exposure so that the zebras appear across the white card. This will give the correct recommended exposure.

If a white card is not available or practical skin tones can be used as an alternative. In this case set the **Zebra1 Level** to 53 for both S-Log2 and S-log3.

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G. Slow Motion, Time-lapse and picture cache

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1. Slow and Quick Motion (S&Q Motion)
2. Interval Record (Time Lapse)
3. Picture Cache Record
4. Imager Scan Mode

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G. Slow Motion, Time-lapse and picture cache

G1. Slow and Quick Motion – S&Q motion

S&Q motion allows the camera to shoot at a frame rate that is faster or slower than the play back frame rate. By shooting at a lower frame rate than the base frame rate action can be sped up, by shooting at a higher frame rate action can be slowed down. When shooting UHD or 4K the camera can shoot at between 1fps and 60fps. When set to HD the camera can record HFR (High Frame Rate) slow motion footage at up to 180fps internally (240fps is possible with the addition of the XDCA-FS7 and a suitable external raw recorder).

No Audio is recorded when using S&Q motion.

G. Slow Motion, Time-lapse and picture cache

In order to use S&Q motion the XAVC-L or XAVC-I codec must be selected

(MENU: System – Codec).

A progressive record format must be used (p) and the base playback rate of any slow motion footage is determined by the selected record format

(MENU: System – Rec Format).

To enable the S&Q mode press the assignable S&Q button or turn it on in the menu

(MENU: Recording – S&Q Motion).

The frame rate can be set either via the menu or by pressing and holding the S&Q button until the frame rate selection menu appears and use the handgrip joystick or SEL/SET dial to select the desired rate.

G1.1 To shoot at more than 60fps you must enable the High Frame Rate mode in the menu

(MENU: Recording – S&Q Motion – High Frame Rate Mode).

There are three options, Off, Full Scan and Center Scan.

G. Slow Motion, Time-lapse and picture cache

G1.2 Full Scan

Uses the full sensor so there is no change to the field of view. However due to the way the sensor is read when shooting HFR, in certain circumstances there may be unwanted artifacts in the footage such as colored rainbow like patterns (moiré) or jagged edges in high contrast areas.

G1.3 Center Scan

Uses only the center portion of the sensor. This eliminates the unwanted artefacts that may be present in full scan HFR, but results in a field of view 2x narrower than achieved with Full Scan.

G. Slow Motion, Time-lapse and picture cache

G1.4 Recommendation: For the best image quality when shooing HFR consider the use of Center Scan.

NOTE: When the camera country area is set to PAL area the maximum frame rate in HD is 150fps. To shoot at 180fps the camera must be set to NTSC Area

(MENU: System – Country –NTSC/PAL Area).

For a comprehensive list of all the frame rates available please refer to the user manual.

When using S&Q motion in Cine EI mode MLUT operation is limited to either MLUT ON for all outputs and recording or MLUT OFF for all outputs and recording.

G. Slow Motion, Time-lapse and picture cache

G2. Interval Record – Time lapse recording

Interval record can be used to capture frames at a preset interval. The frames are then played back as a video clip that significantly speeds up the action in the scene recorded. You can shoot using 4K, UHD or HD.

In order to use Interval Record the XAVC-L, XAVC-I or MPEG HD 422 codec must be selected

(MENU: System – Codec).

A progressive record format must be used (p) and the playback rate of the footage is determined by the selected record format

(MENU: System – Rec Format).

Interval record is enabled and set via the menu

(MENU: Recording – Interval Record)

or it can be assigned to an assignable button.

G. Slow Motion, Time-lapse and picture cache

G2.1 Recommendation: Set the Interval Time to 1 second and the Number of Frames to 1. Increasing the number of frames beyond 1 typically results in jerky motion. A 1 second interval works well for scenes up to 30 minutes long, footage can always be sped up further in post production if required. For longer shooting periods use a longer interval.

Tip: Consider setting the shutter to 1/3 of a second or to 360 degrees, especially when shooting night scenes to add a pleasing blur to movement (If shooting during daylight you may need addition ND filters to control the exposure).

G3. Picture Cache Record

Picture cache record can be used to make the camera include a few seconds of video from the period immediately prior to the press of the record button in each clip. This can be very useful for recording unexpected events. The maximum cache recording period is dependent on the frame size, frame rate and recording codec. Only the XAVC-I, XAVC-L and Mpeg2 HD422 codecs can be used (XAVC-I 59.94p and 50p are not supported). The cache duration is shorter in UHD/4K than in HD, so if you need a long cache period consider shooting in HD rather than UHD/4K

(MENU: Recording – Picture Cache Rec)

For a comprehensive list of the available cache durations for each record mode please refer to the user manual.

G4. Imager Scan Mode

When recording 4K or UHD the full camera sensor is always used. However when shooting in HD it is possible to choose whether to use the full sensor or just the center 2K portion of the sensor. Using just the center portion of the sensor will have the effect of reducing the field of view of the image shot, in effect enlarging the recorded image by a factor of 2 compared to full sensor scan. It also allows the use of lenses designed for use with 16mm film camera (a lens mounting adapter may be required).

The imager scan size can be set in the menu

(MENU: System – Base Settings – Imager Scan Mode)

G. Slow Motion, Time-lapse and picture cache

G4.1 Recommendation: Use Normal Scan when possible as it normally provides the best image quality. Use Center Scan if you need to extend the effective focal length of the lens.

When 2K Full Scan is selected an “F” is added to the frame size indication.

When 2K Center Scan is selected a “C” is added to the frame size indication. Note also how compared to Normal Scan or 2K Full Scan the image now appears enlarged in by 2x.

H. Audio Recording

H1. Audio Recording

An external microphone should be connected to one or both of the XLR inputs for the best results. However if an external microphone is unavailable there is a small microphone built in to the camera body. This Internal MIC can be selected in the menu and recorded on to any of the 4 audio channels

(MENU: Audio – Input Select).

H1.1 If you need to connect more than 2 external microphones to the camera this can be achieved through the use of a Multi-Interface (MI) input adapter or wireless receiver connected to the MI Shoe (the front shoe on the handle). Adapters to add extra XLR inputs as well as single and dual channel wireless microphone receivers are available.

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H. Audio Recording

H1.2 The correct input reference levels for the type of external audio source you are using is selected by switches on the right side of the camera body. In addition if using an external microphone that requires +48V Phantom Power this is enabled by selecting “Mic+48v”.

H1.3 The recording levels for audio channels 1 and 2 can be controlled either automatically or manually using the level control knobs on the left side of the camera body. The recording levels for channels 3 and 4 can be set to automatic or manual in the menu

(MENU: Audio – CH3 Level Control/Ch4 Level Control) and **(Audio – CH3 Input Level/CH4 Input Level)**.

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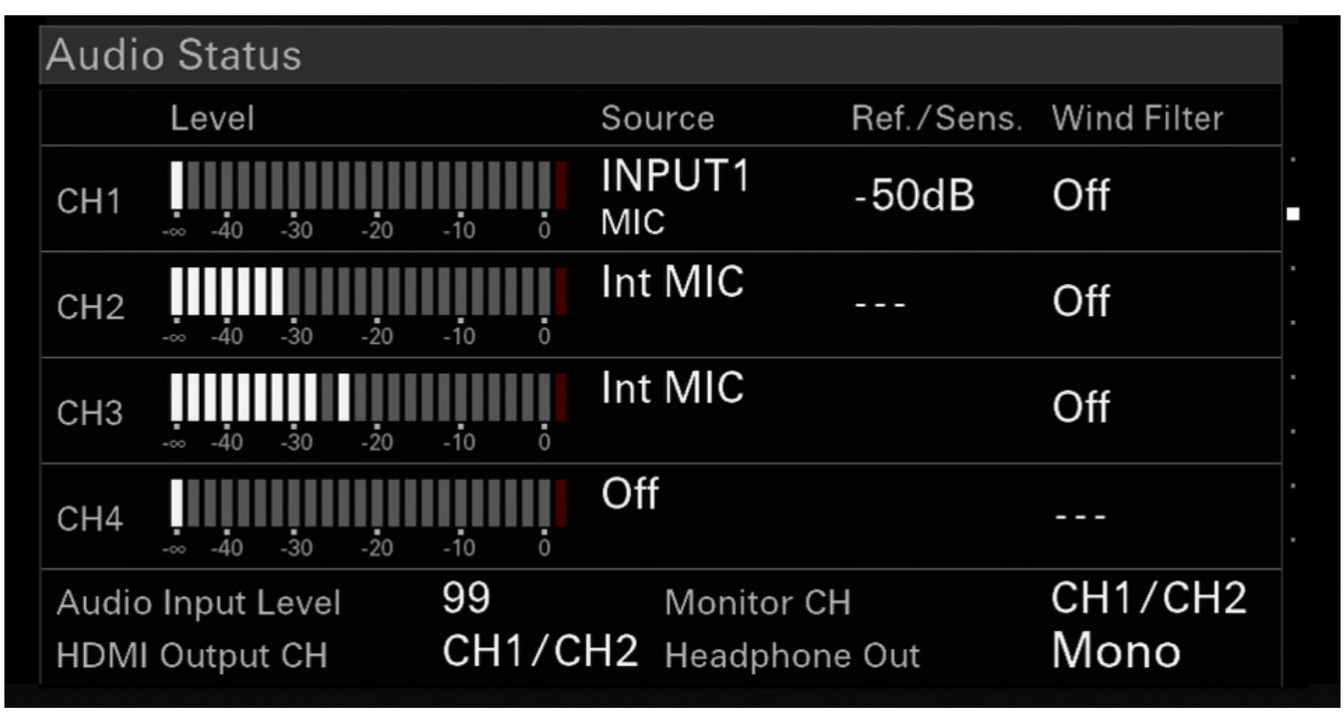
H. Audio Recording

H1.4 To view the audio level meters for all 4 audio channels press the "**Status**" button and use the scroll wheel to select the Audio display page. Press the status button once more to turn off the status display pages.

If using manual audio control do not allow the audio levels to go into the red part of the audio level meters, this will result in distortion.



The Audio STATUS page allows you to view the levels of all 4 audio channels.

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I. Recording, media and troubleshooting

I1. Recording, Recording Media and File Backup

Always use approved XQD cards. Store unused media in a case to prevent dust and debris from accumulating inside the connector slot.

It is recommended that cards are formatted periodically to maintain the best performance.

(MENU: Media – Format Media).

Never remove a card from the camera when the Red led adjacent to the card slot is illuminated.

For additional security it is possible to record to both XQD slots simultaneously

(MENU: Recording – Simul Rec).

Recording for both slots can be controlled by a single record button or independently by the record button on the camera body and the record button on the handle

(MENU: Recording – Simul Rec – Rec Button Set).

When backing up media from the XQD cards to a computer, hard drive or other storage it is important that the entire contents of the card are copied retaining the original file structure. The additional “sidecar” files on the cards contain important metadata and other information important for the correct decoding of the video clips. Use a new folder to store the contents of each card backed up. Do not attempt to merge files from multiple cards into one folder (unless using Sony’s Catalyst Browse application to manage your content).

I2. Error Messages and common problems

Restore Media: If on switching on the camera or inserting an XQD card you see the message “Restore Media” do not worry. This is the camera performing routine maintenance on the card to keep the file system tidy and free from corruption. Always allow the camera to perform the Restore Media function. It is not an error or fault, just housekeeping.

Execute APR: After switching the camera on you may see a message saying “Execute APR”. This is not an error or malfunction. The APR function minimizes the appearance of bright or dark sensor pixels and minimizes sensor noise.

Cover/cap the lens and press SEL/SET to execute the APR function.

If you do not perform APR you will be reminded to perform APR the next time the camera is turned on. You should perform APR regularly to maintain the best possible image quality.

Audio is not being recorded: When using S&Q motion or Interval Record audio recording is not possible.

Unable to enable MLUTS on the HDMI output in the Cine EI mode: The MLUT can only applied to the HDMI output if

(MENU: Video – Output Setting – HDMI Target)

is set to Monitor.

Unable to enable MLUTS for just SDI2, HDMI or the Viewfinder: MLUT operation is limited to ON or OFF for all outputs and internal recording in each of the following situations: The HDMI output is set to 4K/UHD. S&Q Motion is enabled. Lens distortion compensation is set to AUTO

(MENU: System – Lens – Distortion Comp).

Unable to view the Waveform, Vector or Histogram in the Cine EI Mode: Both the SDI2/HDMI output and Viewfinder MLUT settings must be the same.

Viewfinder Information overlays are not being displayed: Press the “Display” button on the camera body to turn the viewfinder and monitor overlays on and off.

System Reset: If the camera is not performing as expected try a system reset to restore the factory defaults.

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